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Science lets nature aid in toxin cleanup

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MURDOCK, Neb. - On a scraggly hillside north of town, summer winds buffet nearly 2,000 saplings planted this spring.

Shwayne McAdory clears trees from the site of a future spillway near Murdock, Neb. The spillway, which will allow water to evaporate, is part of a larger pesticide cleanup plan that includes phytoremediation - the use of plants to help remove a pollutant that vaporizes instantly when exposed to air.

The former cornfield has the feel of a job site - a porta-potty sits in one corner of a gravel lot. Grass and weeds poke through the dirt. Down by a creek, a bulldozer pushes aside earth.

Someday, a shady canopy and native grasses will give this the feel of a park. Schoolchildren will study ecology in the wetlands the bulldozer is creating.

But this landscape has another job: Extracting a pesticide that has contaminated the aquifer and creek.

"There is nothing accidental here," said Lorraine LaFreniere, a geologist with Argonne National Laboratory in Chicago. "This is the result of years of work."

The $1 million project is Nebraska's third to use what is called phytoremediation - plants - to clean up pollution.

The other sites are near Cozad and at Offutt Air Force Base, where plants are being used to extract solvents, said Steve Kemp of the Nebraska Department of Environmental Quality.

The three sites take advantage of a similar characteristic of their pollutants: near instant vaporization when exposed to air.

At Murdock, the trees and wetland plants "drink" water contaminated by carbon tetrachloride, then "exhale" the chemical. A pond in the wetlands and a spillway will encourage more evaporation. Bacteria around tree roots speed decomposition.

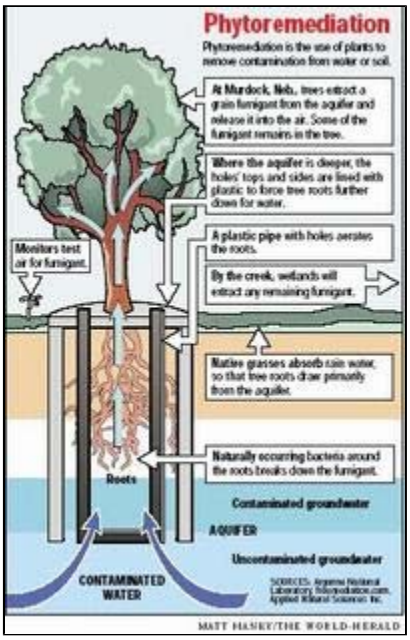
By the time the water leaves the wetlands, there should be no carbon tetrachloride left in it, LaFreniere said.

Across the road at the Elmwood-Murdock High School ball fields, a sprinkler is helping, too. Borrowing from research by the University of Nebraska-Lincoln, it takes up contaminated water from deeper in the aquifer and sends it out in a fine spray that accelerates evaporation.

Scientists anticipate that the focused use of nature will more than halve the years it takes to clean up the pesticide. Carbon tetrachloride has been linked to kidney, liver and nervous system damage.

Instead of 80 years, the aquifer should be rid of the pesticide in 30 years or less, said Eugene Yan, a hydrogeologist for Argonne.

Argonne runs the cleanup on a contract with the U.S. Department of Agriculture. The original contamination comes from former USDA grain bins where carbon tetrachloride was used to kill rats and other pests.



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Phytoremediation is emerging as an acceptable, lower cost alternative to more mechanized cleanups, environmental regulators and scientists say. While not appropriate for every situation,

it can be used with certain pollutants when public health isn't immediately threatened.

In many respects, the Murdock site is ideal, said Steve Gilmore, program manager for the USDA. The community no longer uses local wells for drinking water, and the contamination is within reach of the tree roots.

Gilmore estimates that phytoremediation will save at least $500,000, mostly due to not operating and maintaining pumps.

The ball field sprinkling system is patterned after a pilot project tested by the USDA last year at Utica, Neb. Gilmore said he expects his department to use similar sprinkler systems at other sites in the Midwest.

The USDA has found about 60 sites in Nebraska, Kansas, Missouri and Iowa where its activities released carbon tetrachloride into the ground. More than half are in Nebraska, Gilmore said.

A number of the sites are still being investigated, so it's not known how many will require cleanup, he said.

Any immediate threat to public health, however, has been handled, said Jeff Field of the Environmental Protection Agency. Murdock's municipal wells, for example, were shut down, and the city was connected to a rural water district.

LaFreniere said there's little risk of Murdock's air becoming polluted.

Nebraska's stiff winds will quickly disperse the pesticide, she said. To make certain, scientists are placing air monitors among the trees. Nor are children at risk from water sprayed on the school's ball fields, she said. Kids won't be allowed on the field while the sprinkler is running, and the carbon tetrachloride will have vaporized by the time the water hits the ground.

The EPA, which is requiring the cleanup, is pleased with the progress, Field said.

"Letting it go naturally would take over 80 years," he said. "We're trying to speed that up in a way that will allow Murdock to have its aquifer back for future use and growth."